

ChemRisk/Shonka Research Associates, Inc., Document Request Form

(This section to be completed by subcontractor requesting document)

TO BONNETT 1 JG ROGERS FILE (Box #1)
Requestor Document Center (Is requested to provide the following document)

Date of request 10/24/95 Expected receipt of document _____

Document number _____ Date of document _____

Title and author (if document is unnumbered)

MISC RELEASE REPORTS (13 Documents/- See Review)
Correspondence

(This section to be completed by Document Center)

Date request received 10/24/95

Date submitted to ADC 10/30/95

Date submitted to HSA Coordinator 10/25/95

(This section to be completed by HSA Coordinator)

Date submitted to CICO 10/30/95

Date received from CICO 11/6/95

Date submitted to ChemRisk/Shonka and DOE 11/6/95

(This section to be completed by ChemRisk/Shonka Research Associates, Inc.)

Date document received _____

Signature _____

- 1) Unnumbered Report, Environmental Impact of K-402-9
UF₆ Release of March 11, 1976, no author, no date
- 2) Letter, UF₆ Release, RA Winkel to H D Fletcher, 3/22/76
- 3) K-P-6257, UF₆ Release at K-402-9, March 11, 1976, author -
J C Bailey, et al, dated 5/14/76
- 4) Abnormal incidents which could affect the Environment,
dated May 18, 1977, Author J E Shoemaker
- 5) Material Release Report, 12-1-76, author ~~J E Shoemaker~~ M J Somers
- 6) Material Release Report, 10-18-76, author ~~J E Shoemaker~~ M J Somers
- 7) Material Release Report, 9-17-76, Gerald B. Neely
- 8) Material Release Report, 6-9-76, J K Keith
w/ attachment
- 9) Letter, K-1131 UF₆ Release November 1, 1974,
author J C Bailey, 4/7 Higdon, & J E Shoemaker
to A. J. Legay, dated January 15, 1975
- 10) Unnumbered Report, K-1131 UF₆ Release on
December 19, 1974, J E Shoemaker
- 11) Letter, UF₆ Release K-902-5.2.8 (K-P-6156),
May 9, 1975, J H Monk et al to A J Legay
- 12) Miscellaneous Information on Emissions (Indicates
found in Alice King's office)
- 13) ORGDP UF₆ Material Releases 1/1/84 to 7/15/85
(Indicates found with K/H5-94 [2/28/86] which implies
these quantities were included in the report)

3/11/76
K-402-9
150 grams of UF_6
101.4 g U

ENVIRONMENTAL IMPACT OF K-402-9 UF_6 RELEASE OF MARCH 11, 1976

0025

At approximately 7:30 a.m. on March 11, 1976, a release of UF_6 from the new purge cascade (K-402-9) vent stack was discovered after an incoming employee detected the odor of HF in the vicinity of the K-1231 building (approximately 400 feet north of the vent stack). While sufficient data are not available to quantify the exact amount of material released, or the resulting atmospheric concentrations, data do exist which allow for a reasonable estimate of these values. A summary of the processes employed to arrive at these estimates is presented in the following paragraphs.

The flow regime in the purge cascade during the time of the release was such as to provide for gas flow through the alumina traps prior to release to atmosphere. An investigation after the incident revealed that (1) the traps had become saturated and were thus probably not functioning properly at the time (7:30 a.m.) the release was discovered; (2) approximately 3736 grams of uranyl fluoride had accumulated within the vent pipe; (3) the exit of the pipe was oriented vertically downward toward the roof so as to direct all discharges in the downward position; and (4) approximately 150 grams of uranium were found on the building roof, in a relatively small area beneath the discharge pipe. Since a previous survey of the K-402-9 roof (which was conducted only a few days prior to the release to determine health physics requirements for a reroofing job) revealed no apparent uranium contamination, it was concluded that all of this 150 grams of uranium resulted from the subject release. Furthermore, since the wind was an insignificant factor (about one to two mph from the south) in dispersing the released material, and, since the roof was wet from recent rains, it was also concluded that the vast majority of the uranium that escaped the vent stack, being discharged directly toward the roof, should have remained on the roof. Therefore, a liberal estimate of 250 grams of uranium escaping the vent stack, only 150 grams of which were released to the atmosphere, was formulated. The HF release associated with this 250 grams of uranium would have amounted to about 84 grams. The HF released from the hydrolysis of the material collected on the inside of the vent stack (2887 grams of uranium) would have amounted to about 970 grams, so that the cumulative HF released should have been about 1054 grams. While definitive data relating to the time of the

Prepared by Union Carbide Corporation-Nuclear Division, operating contractor for the U.S. Department of Energy under U.S. Government Contract No. W-7405-eng-26.

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to the public by
11/3/95
Date
G. W. Hall for ASD
Technical Information Officer
Oak Ridge K-25 Site

release through the alumina traps are not available, an estimate of this time can be calculated through the use of atmospheric dispersion equation by realizing that the ground-level HF concentration at the point where it was detected (about 400 feet north of the stack) was at least $100 \mu\text{g}/\text{m}^3$. The release rate required to produce this concentration during the existing meteorological conditions (stable with the wind from the south at 2 mph) would then have been about 0.12 g/sec. The time required to discharge the 1054 grams of HF at this rate would have been approximately 2.4 hours.

Through further use of the dispersion equations it was determined that the maximum ground-level HF concentration at the nearest perimeter fence (1000 feet from the stack) would have been, for the calculated release rate, about $0.3 \text{ mg}/\text{m}^3$. This value is approximately 15% of the recommended 8-hour industrial exposure limit of $2.0 \text{ mg}/\text{m}^3$, and about 138% of the Tennessee 12-hour ambient air concentration limit of $3.7 \times 10^{-3} \text{ mg}/\text{m}^3$, when averaged with background HF levels over a 12-hour period. The maximum uranium concentration at the nearest perimeter fence resulting from the 150 gram release ($0.017 \text{ g}/\text{sec}$) would have been $41.5 \mu\text{g}/\text{m}^3$, which is less than 0.02% of the ERDA chemical toxicity limit, when averaged over a period of one week.



UNION CARBIDE CORPORATION
NUCLEAR DIVISION
P. O. BOX P, OAK RIDGE, TENNESSEE 37830

March 22, 1976

United States Energy Research and Development
Administration, Oak Ridge Operations
Attention: Mr. H. D. Fletcher, Director
Uranium Enrichment Operations Division
Post Office Box E
Oak Ridge, Tennessee 37830

Gentlemen:

UF₆ Release

At about 7:30 a.m. on March 11, 1976, a small release was noticed issuing from the vent stack of the new purge cascade in K-402-9. Based on the appearance of the vent stack, the amount of contamination measured on the roof, and a review of the operations, it has been estimated that no more than one pound of UF₆ was released.

The release was caused by a valving error which resulted in higher-than-normal UF₆ concentrations entering the high-speed cells (which had been isolated from the low-speed section) and the purging of this material through the vent system. The alumina traps, changed only a few days earlier, showed a weight gain of 135 pounds.

An investigation of the incident is under way, and the results will be sent to you when the investigation is complete.

Very truly yours,

R. A. Winkel, Plant Manager
Oak Ridge Gaseous Diffusion Plant

RAW:jc

cc: A. J. Legeay - RC
C. J. Parks
K. W. Sommerfeld
S. S. Stief
W. J. Wilcox, Jr.

Prepared by Union Carbide Corporation-Nuclear
Division, operating contractor for the U.S. Department
of Energy under U.S. Government Contract No.
W-7405-eng-26.

This document has been approved for release
to the public by:

Technical Information Officer
Oak Ridge K-25 Site

Date 11/3/95

Date of Issue: May 14, 1976

Report No. K-P-6257

UF₆ RELEASE AT K-402-9

MARCH 11, 1976

J. C. Bailey
W. A. Davis, Chairman
C. M. Hopper
M. E. Mitchell ✓
R. L. Payne
J. G. Rogers

Handwritten: ~~7/1/76~~ ✓
File

UNION CARBIDE CORPORATION

NUCLEAR DIVISION

Oak Ridge Gaseous Diffusion Plant
Oak Ridge, Tennessee

This document has been approved for release
to the public by:

Sam W. Hall ASQ 11/3/95
Technical Information Officer Date
Oak Ridge K-25 Site

Prepared by Union Carbide Corporation-Nuclear
Division, operating contractor for the U.S. Department
of Energy under U.S. Government Contract No.
W-7405-eng-26.

ABSTRACT

This report describes a UF_6 release which occurred in K-402-9 on March 11, 1976. Events preceding and following the release, health physics and environmental evaluations, and recommendations to prevent future releases are presented.

The alumina traps were a significant factor in reducing the quantity of the release. No significant health physics or environmental impacts resulted.

INTRODUCTION

The new K-402-9 purge cascade contains 7 low-speed cells (1, 3, 5, 7, 9, 10, and 8) and three high-speed cells (6, 4, and 2). These cells are required to separate the light molecular weight gases (*lites*) from the UF_6 before they are discharged to atmosphere, as indicated in Figure 1. System checkout of the new purge cascade has been in progress during March and April.

On March 10, 1976, on the 8 to 4 shift, an attempt was made to tie the flow together between the high- and low-speed cells. An overload condition on the top booster compressors caused one compressor to *trip* due to high amp load. Prior laboratory analyses were indicating high concentrations of Freon in the low-speed cells; hence, the overload condition was initially attributed to Freon, which is denser than the air normally flowing through the top booster pumps. However, this gas stream could have contained some UF_6 , which would have been adsorbed in the alumina traps.

The purge unit was isolated from the remaining cascade and the low-speed section was isolated from the high-speed section. The high-speed section was then connected through the top booster pumps, the alumina traps, and jets to atmosphere. The valving between the low-speed section and the K-29 cascade was arranged to permit the bleeding of light gases to the K-29 West A booster by opening one additional valve (cell 8 evacuation valve).

On March 11, at about 0715, a small release was reported issuing from the vent stack of the new purge unit. The Area Control Room (ACR) was requested to isolate the top booster pumps and purge jets to prevent further emissions to the atmosphere. The evacuation lights for both cells 6 and 8 on the ACR graphic panel indicated *open*. This valving arrangement tied together the high- and low-speed sections. The cell 8 evacuation valve was immediately closed; however, the cell 6 evacuation valve would not close by actuating the *close* button on the graphic panel. Since the cell evacuation valve can be operated from either the ACR or K-402-9, the K-402-9 operator was able to successfully close the valve.

A team consisting of the authors was immediately formed to investigate the incident. This report presents the result of that investigation.

DISCUSSION

Investigation Findings

Inspection of the cell 6 evacuation valve instrumentation revealed that the wiring for the *open* and *close* positions on the K-29 ACR graphic panel were reversed. The cell pressure charts further revealed that this valve was inadvertently opened before 2100 on March 10.

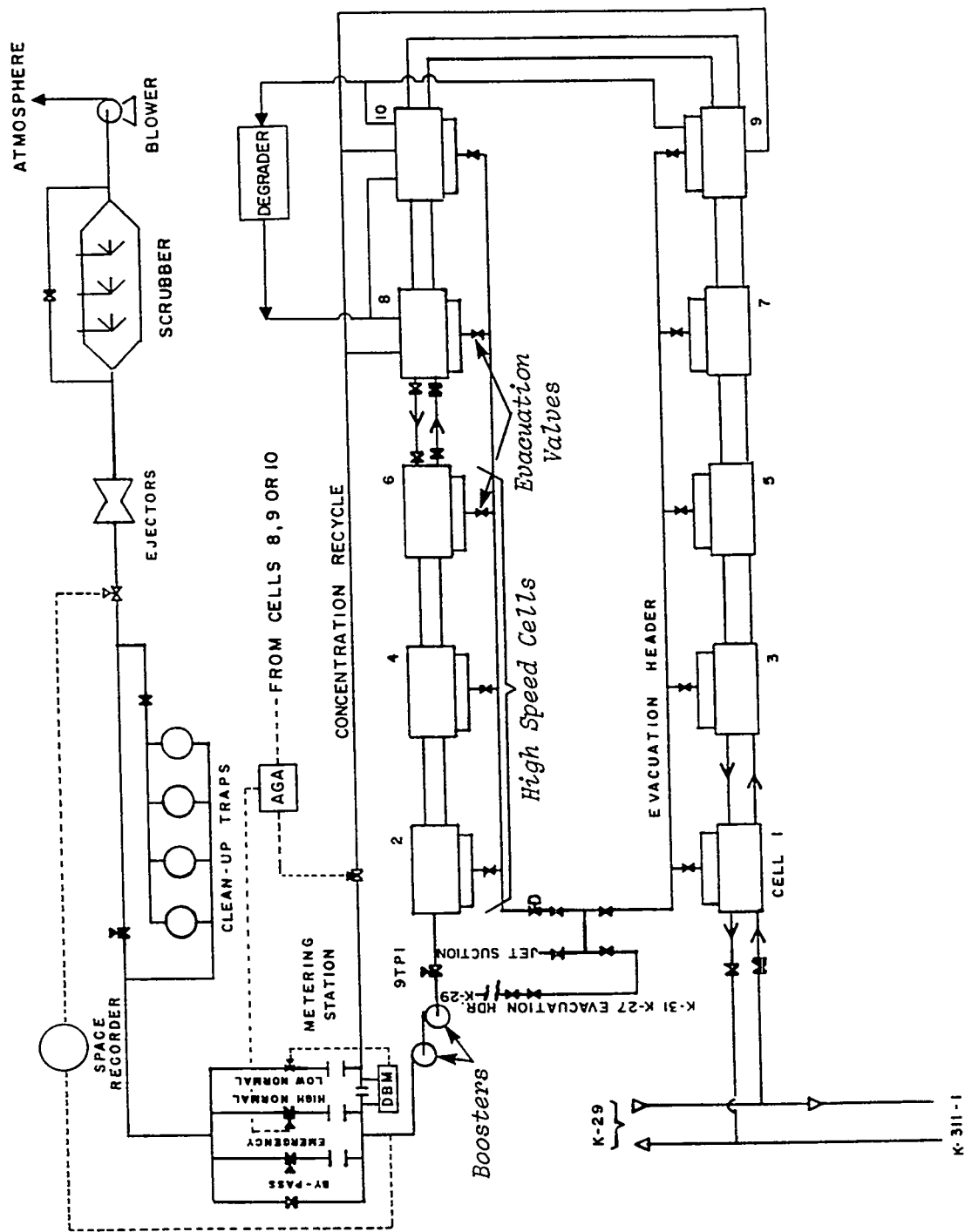


Figure 1

LINE DIAGRAM OF K-402-9 PURGE CASCADE

The cell 8 evacuation valve was opened at 2100 on March 10 to bleed light gases to the K-29 A booster. Since cell 6 evacuation valve was already open, this route also allowed these light gases containing some UF_6 to enter cell 6 and continue through the top boosters, the alumina traps (where a major portion was adsorbed), and the jets to the atmosphere. This *bleed* continued from 2100 on March 10 to about 0730 on March 11, 1976.

Later investigation revealed a gain of 135 pounds UF_6 in the alumina traps. The traps became saturated and ceased to function properly, thus resulting in the release. The amount of UF_6 adsorbed as a result of the opened evacuation valve on cell 6 cannot be determined since some weight gain may have occurred on March 10 when an attempt was made to tie the high- and low-speed cells together.

Nuclear Safety personnel approved the necessary procedures to decontaminate the vent pipe between the alumina traps and the atmosphere, which contained deposits of UO_2F_2 . The recovery operation yielded 2,887 grams of uranium at 3.6 wt. % U-235. The vent pipe outlet, which protruded approximately 10 feet above the roof, was positioned in a horizontal, due South, direction. Approximately 150 grams of uranium were found on the building roof in a relatively small area beneath the vent pipe.

Health Physics Evaluation

Weather conditions prevailing at the time of the release minimized the spread of uranium materials. Wind velocities were essentially zero with only occasional, momentary movement at about 1 to 2 miles per hour, predominately from the South. Humidity was high, as evidenced by considerable fog in the area. These conditions are conducive to the rapid hydrolyzation of UF_6 to UO_2F_2 particulates of relatively large sizes which settle rapidly.

Radiation survey data indicate that the material was dispersed primarily over the roof area to the South of the vent. The data are consistent with the direction of discharge from the vent stack.

Approximate positions of maximum readings on the parapet, seam flashings, and hatch covers are indicated in Figure 2. A survey of the K-402-9 roof conducted only a few days prior to the release to determine health physics requirements for a reroofing job revealed no apparent uranium contamination. On the basis of the survey data shown in Figure 2, the amount of uranium deposited on the roof area did not exceed 150 grams, which was considered to represent a large fraction of the total material released.

Continuous air monitors in K-1131 and in a monitoring trailer north K-1131 indicated no elevated airborne contamination. The continuous air monitor in K-413 indicated airborne contamination of 17% of the

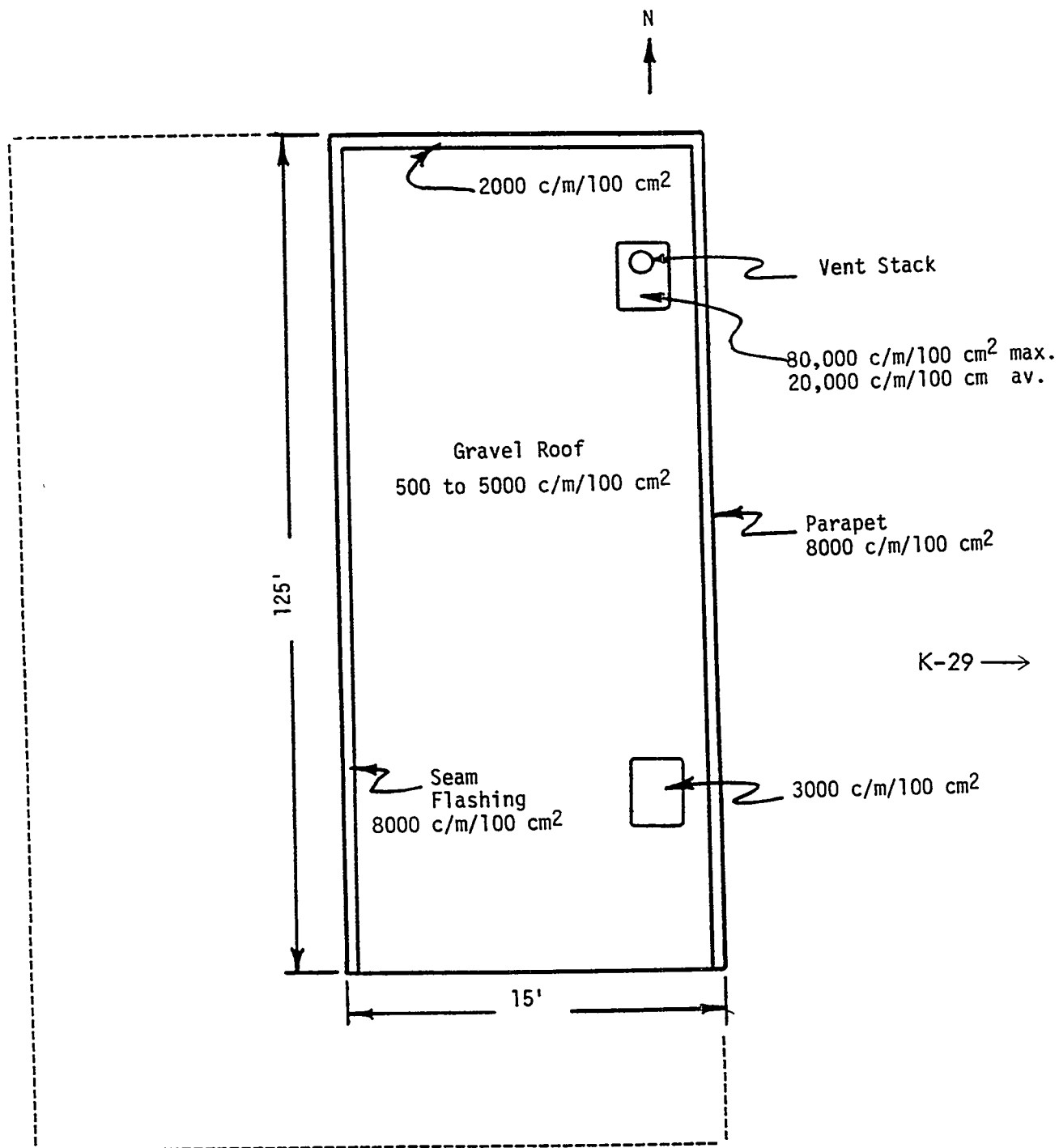


Figure 2
HEALTH PHYSICS SURVEY NORTHEAST CORNER OF K-402-9 ROOF

ERDA radiation protection standard for airborne uranium for continuous exposure for the period 6:30 - 7:00 a.m., 35% from 7:00 - 7:30, and 6.5% from 7:30 - 8:00. Intervals before and after these readings were at background levels. Total exposure over the 1.5 hours covered by these samples is 0.73% of the radiation protection standard for one week. These values are consistent with the indicated weather conditions, and do not represent a significant exposure potential for personnel.

Environmental Evaluation

Although sufficient data are not available to quantify the exact amount of material released or the resulting atmospheric concentrations, a reasonable estimate of these values can be made. By using the above atmospheric conditions and formulating a liberal estimate of 225 grams of uranium escaping the vent stack (150 grams remaining on the roof), the impact of the resulting HF release can be determined. The HF release associated with 225 grams of uranium would be about 76 grams. The HF release from the hydrolysis of the material collected on the inside of the vent stack (2,887 grams of uranium) would be about 970 grams. Hence, the cumulative HF release should be about 1,046 grams. While definitive data relating to the time of the release through the alumina traps are not available, this can be calculated through the use of an atmospheric dispersion equation by realizing that the ground-level HF concentration at the point where it was detected (about 400 feet north of the stack) was at least 100 mg/m^3 . The release rate required to produce this concentration during the existing meteorological conditions (stable with the wind from the South at 2 mph) would then be about 0.12 g/sec. About 2.4 hours would be required to discharge the 1,046 grams of HF at this rate. This agrees with the time interval in which elevated airborne contamination levels were recorded by the K-413 continuous air monitor.

Through further use of the dispersion equations, the maximum ground-level HF concentration at the nearest perimeter fence (1,000 feet from the stack) was about 0.3 mg/m^3 for the calculated release rate. This is ~15% of the recommended 8-hour industrial exposure limit of 2.0 mg/m^3 , and about 138% of the Tennessee 12-hour ambient air concentration limit of $3.7 \times 10^{-3} \text{ mg/m}^3$, which is less than 0.01% of the ERDA chemical toxicity limit, when averaged over a period of one week. In summary, no significant environmental impact can be attributed to this release.

CONCLUSIONS AND RECOMMENDATIONS

It appears that inadvertent opening of the K-402-9.6 evacuation valve resulted in the release of less than 225 grams of uranium. The alumina traps were a significant factor in reducing the quantity of the release. Thus no significant health physics or environmental impacts resulted.

Factors which may have contributed to the release include: (1) unfamiliarity with control panel (instrumentation positioned differently on the control panel than in the existing purge cascade); (2) reversed wiring to the cell 6 evacuation valve light; and, (3) start-up before installation of all control equipment (the Acoustical Gas Analyzer [AGA], which controls the concentration of light gases in the high-speed section, and the Space Recorder, which monitors the concentration of light gases at the top booster pumps, were not functioning properly).

The following recommendations have already been completed:

- (1) All personnel, directly or indirectly associated with the new K-402-9 purge cascade, have been trained by both Engineering and Operations personnel. This training was specifically designed to emphasize the differences between K-311-1 and K-402-9 and should significantly reduce the possibilities of operational errors and aid in controlling K-402-9 in an efficient manner.
- (2) The *open* and *close* buttons associated with the cell 6 evacuation valve have been rewired correctly. All other valves and similar instrumentation are being double checked.
- (3) Metering station instrumentation, the Acoustical Gas Analyzer (AGA), the Space Recorder, and control valves are being checked and adjustments are being made to aid in maintaining the proper amount of light gases in the high-speed cells.
- (4) The feasibility of installing a smoke detector and/or an infrared monitor in the process gas stream near the top booster pumps is being investigated to preclude a future release.

DISTRIBUTION

L. W. Anderson
B. I. V. Bailey
J. C. Bailey
J. C. Barton
O. L. Calvert
T. R. Cantrell
P. S. Cates
W. A. Davis
L. A. Dean
J. Dykstra
C. M. Hopper
S. R. Humphreys
M. E. Mitchell ✓
W. D. McCluen
C. C. McSwain
R. L. Payne
C. H. Peterson
J. G. Rogers
K. W. Sommerfeld
S. S. Stief
W. J. Wilcox
R. A. Winkel
Cascade Coordinators
Shift Superintendents

COPY 2843

Abnormal Incidents

ABNORMAL INCIDENTS WHICH COULD AFFECT THE ENVIRONMENT
(Directions for completing this form on the reverse side)

00212
1

- I. DATE: May 18, 1977
- II. THIS ABNORMAL OCCURRENCE (OCCURRED, WILL OCCUR)
ON May 12, 1977 BETWEEN 0800 and 1700
(Date) (Time Interval)
- III. FACILITY(S) AT WHICH INCIDENT (OCCURRED, WILL OCCUR):
K-33 Cell Floor
- IV. FACILITY OPERATOR: J. E. Shoemaker TELEPHONE EXT. 3-3174
- V. REPORTING EMPLOYEE: J. E. Shoemaker TELEPHONE EXT. 3-3174
- VI. OTHER FACILITIES AFFECTED BY THE INCIDENT: None
- VII. BRIEF DESCRIPTION OF INCIDENT: UF₆ release from process line which was cut into. The line had been purged, but due to a condensation, a quantity of solidified UF₆ was present when the line was cut.
- VIII. MATERIAL (TO BE HANDLED, RELEASED): UF₆
- IX. QUANTITY OF MATERIAL THAT (COULD BE, WAS) RELEASED: < 5 lbs. of UF₆
- X. MEDIUM TO WHICH MATERIAL (COULD BE, WAS) RELEASED: Atmosphere
- XI. OTHER PERTINENT INFORMATION OR COMMENTS: Sixteen Maintenance employees and five Operations employees were recalled due to high U content in their urine samples.

This document has been approved for release
to the public by:
Greg W. Hall per ASD 4/3/95
Date
Technical Information Officer
Oak Ridge K-25 Site

-/18/77
K-33 2270g ^{UF₁₂₋₇₆₁}
~ 5.1lb (2) 1535g ^{UF₆}
of UF₆

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Division, operating contractor for the U.S. Department
of Energy under U.S. Government Contract No.
W-7405-eng-26.

DIRECTIONS FOR COMPLETING FORM

- I. DATE form is completed.
- II. Day, Month, Year and Time Interval over which the incident occurred or will occur.
- III. FACILITY (Building, Area, etc.) where incident occurred or will occur.
- IV. FACILITY OPERATOR is the individual responsible for the Facility at which the incident occurred or will occur.
- V. REPORTING EMPLOYEE is the individual filling out the form.
- VI. OTHER FACILITIES include adjacent, downwind or down stream operations that were or will be affected by the incident.
- VII. BRIEF DESCRIPTION OF INCIDENT, including reason for incident and what steps were or will be taken to reduce environmental impacts.
- VIII. MATERIAL involved, such as acids, caustics, UF₆, etc., and the phase in which it exists (solid, liquid, gas).
- IX. QUANTITY OF MATERIAL in volume and/or weight.
- X. MEDIUM means atmosphere, surface streams, or soil.
- XI. OTHER PERTINENT or relevant information such as who has or will be notified of incident, special precautions that should be or were taken, personnel sent to Dispensary, etc.

Technical Information Officer
Oak Ridge K-25 Site

SEE SPP 354, "Reporting of Accidents, Injuries, or Other Unusual Operating Incidents"

MATERIAL RELEASE REPORT

Time of Release 0900 Foreman in Charge M. T. Somers
Date of Release 12-1-76 At Time of Release
Type of Material (F₂, UF₆, Etc.) UF₆ Duration or Release Few seconds

Location K-602-5.2, Cell Floor
(BUILDING) (FLOOR) (EQUIPMENT INVOLVED)

Approximate Amount of Release < 5 grams Time Emergency Cleared 0930

Description of Release (Cause, Area Affected, Etc.)

Puff of smoke emanated from between the seats of Valve 2AB1 as the adjacent line was being bled to atmosphere.

PERSONNEL REFERRED TO THE DISPENSARY

NAME BADGE NO. LOCATION AT TIME OF RELEASE

K-31 Cell Floor
K-31 Cell Floor
K-31 Cell Floor

K-31
602.5-2
< 5 grams
of UF₆
12/1/76 3,4 g u.

OTHER PERSONNEL IN AREA

MONITORING FOR RADIOACTIVE CONTAMINATION
AIR-BORNE ALPHA ACTIVITY

LOCATION TIME ACTIVITY (C/MIN/FT³)

SURFACE ALPHA CONTAMINATION

RANGE IN C/MIN SURFACE WIPE
Class I 500 - 2000 100 - 500
Class II 2000 - 10,000 500 - 2000
Class III > 10,000 > 2000

BETA-GAMMA RADIATION

RANGE MREP / HR
Class I 7.5 - 37.5
Class II 37.5 - 300
Class III 300 - 3000
Class IV > 3000

BEFORE DECONTAMINATION				AFTER DECONTAMINATION			
AREA (FT ²)		MAX. READING		AREA (FT ²)		MAX. READING	
SURFACE	WIPE	SURFACE	WIPE	SURFACE	WIPE	SURFACE	WIPE
MAXIMUM READING	READING AT 1'	7.5 MREP/HR DISTANCE		MAXIMUM READING	READING AT 1'	7.5 MREP/HR DISTANCE	

Clean-up Method Used No resulting contamination Cost of Clean-up 0

What Specific Actions Have Been Taken to Prevent a Similar Incident?

SUPERVISOR [Signature] DEPARTMENT 1730 DATE 12-2-76

APPROVED: DIVISION SUPERINTENDENT OR REPRESENTATIVE

Prepared by Union Carbide Corporation-Nuclear

DISTRIBUTION:

- (1) WHITE - SAFETY, FIRE AND RADIATION CONTROL
(2) YELLOW-URANIUM CONTROL
(3) BLUE - DIVISION
(4) PINK - SUPERVISOR
- Division, operating contractor for the U.S. Department of Energy under U.S. Government Contract No. W-7405-eng-26.

MATERIAL RELEASE REPORT

Mike Mitchell

SEE SPP 354, "Reporting of Accidents, Injuries, or Other Unusual Operating Incidents"

Time of Release 10:00 p.m. Foreman in Charge
Date of Release 10-18-76 At Time of Release M. T. Somers
Type of Material (F₂, UF₆, Etc.) UF₆ Duration or Release Few seconds

Location K-602-3.10 Cell Floor Stage 10 compressor 'B' seal
(BUILDING) (FLOOR) (EQUIPMENT INVOLVED)

Approximate Amount of Release 10 grams (1.2% U²³⁵) Time Emergency Cleared 10:30 p.m.
Description of Release (Cause, Area Affected, Etc.) A datum failure in K-602-4 caused that unit to evacuate, dumping inventory downstream. The resulting downsurge loaded K-602-3.10 to above atmosphere, and UF₆ was released through the stage 10 'B' seal until the seal system instrumentation could react.

PERSONNEL REFERRED TO THE DISPENSARY

NAME BADGE NO. LOCATION AT TIME OF RELEASE

K-602-3.10
K-602-3.10
K-602-3.10

K-31
602-3-10
10/18/76

OTHER PERSONNEL IN AREA

None

10 grams of
UF₆
6.8 g.

MONITORING FOR RADIOACTIVE CONTAMINATION
AIR-BORNE ALPHA ACTIVITY

LOCATION TIME ACTIVITY (C/MIN/FT³)

SURFACE ALPHA CONTAMINATION

RANGE IN C/MIN	SURFACE	WIPE
Class I	500 - 2000	100 - 500
Class II	2000 - 10,000	500 - 2000
Class III	> 10,000	> 2000

BEFORE DECONTAMINATION				AFTER DECONTAMINATION			
AREA (FT ²)		MAX. READING		AREA (FT ²)		MAX. READING	
SURFACE	WIPE	SURFACE	WIPE	SURFACE	WIPE	SURFACE	WIPE
NONE FOUND							
MAXIMUM READING		READING AT 1'	7.5 MREP/HR DISTANCE	MAXIMUM READING		READING AT 1'	7.5 MREP/HR DISTANCE
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BETA-GAMMA RADIATION

RANGE	MREP / HR
Class I	7.5 - 37.5
Class II	37.5 - 300
Class III	300 - 3000
Class IV	> 3000

Clean-up Method Used None required Cost of Clean-up NA

What Specific Actions Have Been Taken to Prevent a Similar Incident?

SUPERVISOR M. T. Somers DEPARTMENT 1730 DATE 10-20-76
APPROVED: DIVISION SUPERINTENDENT OR REPRESENTATIVE [Signature] DATE 10/21/76

DISTRIBUTION:

- (1) WHITE - SAFETY, FIRE, AND RADIATION CONTROL
- (2) YELLOW - URANIUM CONTROL
- (3) BLUE - DIVISION

Ray W. Hall Jr ASQ
Technical Information Officer
Oak Ridge K-25 Site

11/3/95
Date

MAINTENANCE RELEASE REPORT

SEE SPP 354, "Reporting of Accidents, Injuries, or Other Unusual Operating Incidents"

Time of Release 0600 Foreman in Charge
Date of Release 9-17-76 At Time of Release Gerald B. Neely
Type of Material (F₂, UF₆, Etc.) UF₆ Duration of Release Few seconds

Location K-33 Cell Floor Valve 7AB1
(BUILDING) (FLOOR) (EQUIPMENT INVOLVED)

Approximate Amount of Release <50 grams Time Emergency Cleared 0615
Description of Release (Cause, Area Affected, Etc.) Valve 7AB1 was cracked to relieve above atmospheric pressure in a 6" feed header to cell K-902-5.7 which was open to atmosphere. UF₆ which had been trapped between the seats of the G-17 valve was swept to atmosphere with the nitrogen gas from the 6" header.

PERSONNEL REFERRED TO THE DISPENSARY

NAME BADGE NO. LOCATION AT TIME OF RELEASE

List provided by Maintenance

9/17/76

K-33

< 50 grams

of UF₆

34 g u.

OTHER PERSONNEL IN AREA

Prepared by Union Carbide Corporation-Nuclear Division, operating contractor for the U.S. Department of Energy under U.S. Government Contract No. W-7405-eng-26.

MONITORING FOR RADIOACTIVE CONTAMINATION
AIR-BORNE ALPHA ACTIVITY

LOCATION TIME ACTIVITY (C/MIN/FT³)

SURFACE ALPHA CONTAMINATION

RANGE IN C/MIN	SURFACE	WIPE
Class I	500 - 2000	100 - 500
Class II	2000 - 10,000	500 - 2000
Class III	> 10,000	> 2000

BETA-GAMMA RADIATION

RANGE	MREP / HR
Class I	7.5 - 37.5
Class II	37.5 - 300
Class III	300 - 3000
Class IV	> 3000

BEFORE DECONTAMINATION				AFTER DECONTAMINATION			
AREA (FT ²)		MAX. READING		AREA (FT ²)		MAX. READING	
SURFACE	WIPE	SURFACE	WIPE	SURFACE	WIPE	SURFACE	WIPE
No detectable alpha contamination at release point to atmosphere.							
MAXIMUM READING		READING AT 1'	7.5 MREP/HR DISTANCE	MAXIMUM READING		READING AT 1'	7.5 MREP/HR DISTANCE

Clean-up Method Used _____ Cost of Clean-up _____

What Specific Actions Have Been Taken to Prevent a Similar Incident? Supervisor cautioned to remember that even though lines on both sides of a G-17 valve may be purged, some quantity of UF₆ may be between the valve seats.

SUPERVISOR *[Signature]* DEPARTMENT 1730 DATE 9-17-76
APPROVED: DIVISION SUPERINTENDENT *[Signature]* DATE 9/17/76
OR REPRESENTATIVE

DISTRIBUTION:

- (1) WHITE - SAFETY, FIRE, AND RADIATION CONTROL
- (2) YELLOW - URANIUM CONTROL
- (3) BLUE - DIVISION

This document has been approved for release to the public by: Ray W. Hall on 4/5/76 11/3/75
Technical Information Officer Date
Oak Ridge K-25 Site

MATERIAL RELEASE REPORT

SEE SPP 354, "Reporting of Accidents, Injuries, or Other Unusual Operating Incidents"

Time of Release 1:30 p.m. Foreman in Charge _____
Date of Release June 9, 1976 At Time of Release J. K. Keith
Type of Material (F₂, UF₆, Etc.) UF₆ Duration of Release 15 minutes

Location K-1420 "C" Bay 42" block valve
(BUILDING) (FLOOR) (EQUIPMENT INVOLVED)

Approximate Amount of Release 500 grams Time Emergency Cleared 2:35 p.m.
Description of Release (Cause, Area Affected, Etc.) A 42-inch diameter block valve was sent to K-1420 for decontamination. When maintenance personnel opened the valve, the release occurred. It was later determined that the valve bonnet had not been purged adequately. (The valve was from below feed point in K-33. Approximate assay 0.65% U-235.)

PERSONNEL REFERRED TO THE DISPENSARY

NAME BADGE NO. LOCATION AT TIME OF RELEASE
None _____

6/9/76

500 grams of UF₆

K-1420 338 gu.
"C" Bay

Prepared by Union Carbide Corporation-Nuclear Division, operating contractor for the U.S. Department of Energy under U.S. Government Contract No. W-7405-eng-26.

MONITORING FOR RADIOACTIVE CONTAMINATION AIR-BORNE ALPHA ACTIVITY

LOCATION	TIME	ACTIVITY (C/MIN/FT ³)
Immediate Area	1:44 p.m.	125
Immediate Area	1:55 p.m.	43
Immediate Area	2:18 p.m.	1.8
Immediate Area	2:31 p.m.	0.37

SURFACE ALPHA CONTAMINATION

RANGE IN C/MIN	SURFACE	WIPE
Class I	500 - 2000	100 - 500
Class II	2000 - 10,000	500 - 2000
Class III	> 10,000	> 2000

BETA-GAMMA RADIATION

RANGE	MREP / HR
Class I	7.5 - 37.5
Class II	37.5 - 300
Class III	300 - 3000
Class IV	> 3000

BEFORE DECONTAMINATION				AFTER DECONTAMINATION			
AREA (FT ²)		MAX. READING		AREA (FT ²)		MAX. READING	
SURFACE	WIPE	SURFACE	WIPE	SURFACE	WIPE	SURFACE	WIPE
MAXIMUM READING		READING AT 1'		7.5 MREP/HR DISTANCE		MAXIMUM READING	

Clean-up Method Used Washed valve out with water. Cost of Clean-up Nominal
What Specific Actions Have Been Taken to Prevent a Similar Incident? Valves will be purged before being brought to K-1420.

SUPERVISOR M. George M. Rae DEPARTMENT 1785 DATE 7/1/76
APPROVED: DIVISION SUPERINTENDENT [Signature] OR REPRESENTATIVE O.L. Calvert DATE 7/2/76

DISTRIBUTION:

- (1) WHITE - SAFETY, FIRE, AND RADIATION CONTROL
- (2) YELLOW - URANIUM CONTROL
- (3) BLUE - DIVISION
- (4) GREEN - SUPERVISOR

Environmental Impact of K-1420 UFe Release on June 9, 1976

At approximately 3:20 PM on June 9, 1976 the Environmental Management Group was advised that a UFe release had occurred at K-1420. Portable gas bubbler samplers were set up at two existing Hi-Volume Air sampler sites. The two sites chosen were the stations located north of K-25 and west of K-31, as these appeared to be most directly in the path of the prevailing winds.

While the data collected in the samplers actuated following the release indicated no detectable increase in atmospheric concentrations, the fact that these samplers ^{were} ~~not~~ ~~not~~ actuated until one hour after the release occurred tends to ~~preclude~~ preclude any meaningful interpretation of the data. Therefore an evaluation of the effects of the uranium and HF released could only be made through the use of a mathematical model predicting the dispersion of the pollutants.

Considering that the total capacity of the glove box is approximately 10 cubic feet and applying the appropriate correction factors for temperature and pressure, the maximum quantity of UFe which

and have been trapped was determined to be approximately 1.1 pounds. By applying stoichiometric equations assuming that 75% of the material was inhaled from the valve and 50% of this material exited the building through the exhaust system, it was determined that ~~127~~ ^{A MAXIMUM OF} 127 grams of uranium were released from the building. Assuming that 100% of the HF produced from escaped through the building exhaust system, the total quantity involved was determined to be 114 grams. Based on eye witness accounts of the release and an explanation of the unusual method which was used to purge the valve the estimated quantities are thought to be ~~extremely liberal~~ extremely liberal.

For purposes of diffusion modeling ^{it} was determined that: (1) The wind was blowing from the north-northeast at 20 miles per hour (8.94 m/sec), (2) The effective release height was approximately 113 feet (34.3 m), (3) The exit gas velocity was approximately 39.6 feet per second (12.1 m/sec), and ^{further} it was assumed that (4) The 127 grams of uranium was released during a 3 minute period thus yielding a release rate of 0.71 grams/second, (5) The 114 grams of HF was released during a 10 minute period thus yielding a release rate of 0.19 grams/second, and (6) Meteorological conditions were considered to be stable.

THE HISTORY OF THE JOHNSON DIT

Calculations were performed for two locations one at the center of the plant (approximately 2900 feet from the source) and another at the west perimeter fence (approximately 6800 feet from the source). Maximum theoretical ground level concentrations at these locations were found to be U - $1.1 \times 10^{-3} \mu\text{g}/\text{m}^3$, HF - $3.3 \times 10^{-7} \text{ppb}$, and U - $1.1 \mu\text{g}/\text{m}^3$, HF - 0.84ppb , respectively.

~~At the center of the plant (approximately 2900 feet from the source) the maximum theoretical ground level concentrations were found to be U - $1.1 \times 10^{-3} \mu\text{g}/\text{m}^3$, HF - $3.3 \times 10^{-7} \text{ppb}$, and at the west perimeter fence (approximately 6800 feet from the source) the maximum theoretical ground level concentrations were found to be U - $1.1 \mu\text{g}/\text{m}^3$, HF - 0.84ppb , respectively.~~

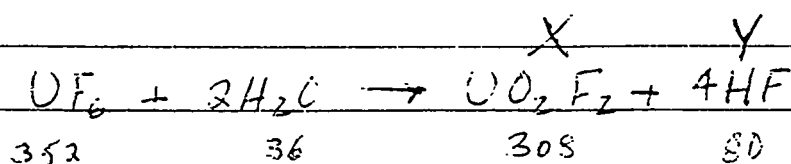
The average background concentrations for the four monitoring stations nearest the plant perimeter during the period January to April 1976 were U - $9.4 \times 10^{-3} \mu\text{g}/\text{m}^3$, and HF - 0.67ppb .

Comparison of ~~average~~ values predicted by the dispersion modeling equations (for the station located at the west perimeter fence) with applicable standards and guidelines reveals: (1) The HF concentration is less than 0.0001% of the recommended 8-hour industrial exposure limit of $3.0 \text{mg}/\text{m}^3$ (2427ppb), and approximately 7% of the Tennessee 12-hour ambient air concentration limit of $3.7 \times 10^{-3} \text{mg}/\text{m}^3$ (4.5ppb). And (2) The maximum uranium concentration at this location ($1.1 \mu\text{g}/\text{m}^3$) is less than 0.0005% of the ERDA chemical toxicity limit, when averaged over a period of one week.

ASSUME 190°F.

(1)

$$\frac{.98 \text{ LB}}{\text{FT}^3} \times 10 \text{ FT}^3 \times \frac{535}{650} \times \frac{2}{14.7} = 1.10 \text{ LB}$$



75% LOSS \rightarrow 50% TO ATMOSPHERE
FROM VALVE 3 MINUTES

100% HF \rightarrow OUT IN ~~3~~¹⁰ MINUTES

$$\begin{array}{rcl} 499.5 & + & 51 \rightarrow 437 + 113.5 \\ 550.5 & & \rightarrow 550.5 \end{array}$$

$$\text{TOTAL U} = 437 \text{ grams} \times \frac{238}{308} = 338 \text{ GRAMS}$$

$$\text{TOTAL HF} = 113.5 \text{ GRAMS}$$

ASSUMING 75% LOSS OF U AND 50% EXITING
BUILDING, A TOTAL OF 127 GRAMS WAS LOST
TO ATMOSPHERE

~~ORIGINAL~~ ASSUMING 100% HF LOSS

114 GRAMS WAS EXHAUSTED TO THE ATMOSPHERE

WIND SPEED \rightarrow 20 MPH EAST TO N. EAST
TO K-401 1600 FT
TO MIDDLE OF K-25 2800 FT
TO K-762 6800 FT

(2)

$g = 9.8 \text{ m/sec}^2$

$T_s = 80^\circ\text{F} = 300^\circ\text{K}$

$T_A = 70^\circ\text{F} = 294^\circ\text{K}$

$D = 41'' \times 28'' = 34'' \text{ DIA} = 0.86 \text{ m}$

$V_s = 39.6 \text{ FT/sec} = 12.1 \text{ m/sec}$

$h_s = 51 \text{ FT} = 15.5 \text{ m}$

$u = 20 \text{ mi/hr} = 8.94 \text{ m/sec}$

$F = g V_s \left(\frac{D}{2}\right)^2 \left[\frac{T_s - T_A}{T_A}\right] = 4.76$

$G = \frac{g}{T_A} \times \frac{1.8}{100} = 6 \times 10^{-4}$

$Ah = 2 \left(\frac{F}{\pi G}\right)^{0.33} = 2 \left(\frac{4.76}{8.94(0.0006)}\right)^{0.33} = 2(887.4)^{0.33} = 18.79$

$h = h_s + Ah = 15.5 + 18.79 = 34.3 \text{ m}$

	$\frac{AT}{X} = 488 \text{ m}$	853 m	2073 m	760 2316
$\sigma_y = 0.31 X^{-0.71} =$	25	37.4	70.2	75
$\sigma_z = 0.06 X^{-0.71} =$	4.9	7.2	13.6	14.

RELEASE RATES = ()

$U = 127 \text{ GRAMS } 3 \text{ MINUTES} = 0.71 \text{ gm/sec}$

$HF = 113.5 \text{ GRAMS } 10 \text{ " } = 0.19 \text{ gm/sec}$

$$X_{U+85} = \frac{Q}{\pi \sigma_y \sigma_z u} \exp \left\{ -\frac{h^2}{2 \sigma_z^2} \right\} = \frac{0.71}{3.14(25)(4.9)(8.94)} \exp \left\{ -\frac{(34.3)^2}{2(4.9)^2} \right\} = 4.7 \times 10^{-15} \text{ gm/m}^3$$

$$X_{HF+85} = \frac{0.19}{3.14(25)(4.9)(8.94)} \exp \left\{ -\frac{(34.3)^2}{2(4.9)^2} \right\} = 1.25 \times 10^{-15} \text{ gm/m}^3$$

(3)

$$X_{W 853} = \frac{0.71}{3.14(37.4)(4.9)8.94} \exp \left\{ \frac{(34.3)^2}{2(7.2)^2} \right\} = 1.11 \times 10^{-4} \text{ g/m}^3$$

$$X_{HF 853} = \frac{0.19}{3.14(37.4)(7.2)8.94} \exp \left\{ \frac{(34.3)^2}{2(7.2)^2} \right\} = 2.97 \times 10^{-10} \text{ g/m}^3$$

$$X_{W 2073} = \frac{0.71}{3.14(70.2)(3.6)8.94} \exp \left\{ \frac{(34.3)^2}{2(3.6)^2} \right\} = 1.10 \times 10^{-6} \text{ g/m}^3$$

$$X_{HF 2073} = \frac{0.19}{3.14(70.2)(3.6)8.94} \exp \left\{ \frac{(34.3)^2}{2(3.6)^2} \right\} = 2.98 \times 10^{-7} \text{ g/m}^3$$

$$X_{W 2316} = \frac{0.71}{3.14(75.9)(14.7)8.94} \exp \left\{ \frac{(34.3)^2}{2(14.7)^2} \right\} = 1.47 \times 10^{-6} \text{ g/m}^3$$

$$X_{HF 2316} = \frac{0.19}{3.14(75.9)(14.7)8.94} \exp \left\{ \frac{(34.3)^2}{2(14.7)^2} \right\} = 3.94 \times 10^{-7} \text{ g/m}^3$$

NORTH

WEST

SITE

SITE

1 ppb F⁻
0.05 µg/m³ U

0.8 ppb F⁻
0.05 µg/m³ U

Avg FOR 4 STATIONS NEAREST PLANT

F⁻ - 0.64 ppb

U - 1.4 x 10⁻² µg/m³

K-901 PUMP HOUSE

JUNE 8-9, 1976

13.0 ppb F⁻

BLAIR RD.

0.3 "

CREDIT UNION

0.1 "

6/9/76

UF₆ RELEASE, K-1420

Distribution

T. W. Avera - Bldg. K-1401, MS-369
J. C. Bailey - Bldg. K-1570-B, MS-250
R. E. Cable - Bldg. K-131, MS-306
O. L. Calvert - Bldg. K-303-7, MS-341
T. R. Cantrell - Bldg. K-303-7, MS-343
W. A. Davis - Bldg. K-303-8, MS-335
L. A. Dean - Bldg. K-1035, MS-219
J. K. Keith - Bldg. K-1420, MS-347
A. J. Legeay - Bldg. K-303-7, MS-337
M. C. Martin - Bldg. K-33, MS-310
F. B. McDonald - Bldg. K-1401, MS-365
N. G. McRae - Bldg. K-1420, MS-347
M. E. Mitchell - Bldg. K-1551, MS-127 ✓
W. T. Northcutt - Bldg. K-303-8, MS-343
M. J. E. Shelton - Bldg. K-1420, MS-347
J. E. Shoemaker - Bldg. K-902-8, MS-309
L. H. Sipe - Bldg. K-1570-B, MS-250
K. W. Sommerfeld - Bldg. K-1001, MS-215
C. L. Stair - Bldg. K-1551, MS-127
S. S. Stief - Bldg. K-1001, MS-141
D. J. Tevault - Bldg. K-902-8, MS-309
H. D. Whitehead, Jr. - Bldg. K-1420, MS-347
R. A. Winkel - Bldg. K-1001, MS-139

Introduction

On Wednesday, June 9, 1976, a 42-inch diameter block valve, which had been sent from K-33 to K-1420 for decontamination, was being opened by Maintenance personnel. The 31-ton crane was being used to raise the valve stem. As the stem was pulled up, the whole valve assembly lifted three to four inches from the floor before the gates became unseated. This allowed the valve body to fall back to the floor resulting in the release. Personnel were evacuated from the building until the release could be controlled.

Description

Three 42-inch diameter block valves were received in K-1420 on Tuesday, June 8, 1976. Two of the valves were closed and one was in the open position. The valve which was open was decontaminated on the "C" floor-pan Wednesday morning, June 9. The cleaned valve was moved to the east end of the building to await shipment to K-1401.

K-1401 Maintenance Shop personnel contacted K-1420 Chemical Operations personnel on Wednesday morning, June 9, to make arrangements for opening the two closed valves so they could be cleaned properly. The shop supervisor stated that he had been informed by K-33 Field Maintenance personnel that the valves had been purged. Operations agreed, in the interest of saving time, that a crew of maintenance mechanics could be brought to K-1420 to open the valves.

The first of the two valves was set upright on the concrete drain pad at the "C" floor-pan and the packing gland was removed. When the valve stem was pulled up, using the 31-ton bridge crane, the whole valve assembly lifted three to four inches from the floor before the gates became unseated. This allowed the valve body to fall back to the floor. The resulting bump caused white powder to fall out of the valve body onto the floor and white vapor began to cloud the area. The two maintenance mechanics and their supervisor evacuated the building.

The noise created by the bump of the valve body falling to the floor caused the personnel in the K-1420 Operations Office to notice the release immediately. An announcement was made on the building public address system telling all personnel to evacuate the building.

Several supervisors and operators began to shut off the building ventilating and exhaust systems, close all roll-up doors, and hose the valve and floor around it with water to control the release. The elapsed time between the start of the release and the completion of shut-off of all exhaust and ventilating systems, closing of roll-up doors, and evacuation of all personnel not directly involved in attempting to control the release was not more than 10 minutes. Health Physics personnel had arrived by this time and began taking air samples.

Health Physics personnel gave the "all clear" signal at 2:35 p.m. and all personnel returned to work. The release having occurred at 1:30 p.m., the total time off the job was 1 hour 5 minutes.

All supervisors who had personnel working in K-1420 at the time of the release were asked to have their people leave a urine sample, take a shower, and put the coveralls they were wearing in the dirty clothes bins at the end of the day.

An investigation was held at 3:00 p.m., June 9, in K-1420. The following background information was provided about the valves.

The valve which released the material was the "A" outlet valve from Cell 902-4.8 which was part of the experimental 16-stage cell known as 902-4.108. This cell was built by removing the interconnecting block valves between cells 902-4.10 and 902-4.8. The bypass lines which were taken out of service due to this modification were blanked off at the front of the cells near the cell bypass lines.

This cell was to be returned to its original configuration prior to PEM improvements on either 902-4.10 or 902-4.8. Plans were made to accomplish this work in two distinct phases:

- 1) Cell 902-4.108 would be purged and shut down to replace the intercell piping and valving between cell 10 and cell 8.
- 2) The cascade would be split to remove the blanks in front of the building. Since all cell A-valves are either replaced with uprated or relocated valves during CIP/CUP, the decision was made to do this work at the time the blanks were removed, and avoid a later cascade split. This involved the cell 8 A-outlet valve (8AB2), the cell 10 A-inlet valve (10AB1), and the cell 8 A-bypass valve (8AP) which had previously failed.

After Phase 1 was completed, one of the two cells had to be returned to service as soon as possible since the more desirable method of heating the bypass lines is from process waste heat. The decision was made to return cell 10 to service first since there was little piping work to do once the valves had been installed. Cell 8 required extensive piping work to reinstall the recycle piping and cooler. Therefore, the following steps were initiated:

- 1) Cell 108 was removed from service and shut down on the 4-12 shift on June 1, 1976.
- 2) Intercell piping work was begun on the 12-8 shift on June 2, 1976.

- 3) Since cell 10 would be ready to go onstream well before cell 8, valves 8AB2 and 8BB1 were purged in the closed position by running a hose to 6AB1 on June 2 prior to the cascade split. 8AB2 and 8BB1 could not be opened since the cascade was on one side of the valves, and cell 8, open to atmosphere, was on the other side. It was discovered on June 2 that 8AB2 seats leaked to the cascade side, and a 5-psig buffer was applied between the seats.
- 4) Cell 10 was turned back to Operations on the 8-4 shift on June 4. The cascade was split and the A and B bypass lines were purged through 10AB1 and 10BB2 through cell 10 to surge drums. Again 8AB2 could not be opened since cell 8 was open to atmosphere. Valves 8AB2, 8AP, and 10AB1 were removed along with the blank in the A-line. (8BB1 was not removed due to time limitations.) All work was complete and the cascade was remade at 0355 on June 6.

42-inch diameter block valves are normally purged with the gates open. This allows the valve body to be purged at the same time as the process lines. They are generally closed before removal due to the close quarters in which these valves are installed. Valve 8AP had failed in the open position and was therefore purged satisfactorily. Valve 10AB1 was purged in the usual manner as mentioned above. Valve 10AB1 was opened on June 10 in K-1420 with no resulting release. It should be noted that considerable difficulty was experienced by the shop crew in opening this valve.

Conclusions

1. As stated previously, purging valve 8AB2 was through a hose to 6AB1. It was determined, during the cleaning of 8AB2 in K-1420, that the buffer gas line was plugged with UF_6 hydrolization products. The leak through the valve's seats discovered on June 2 was probably the cause of this plug, hence purging was not accomplished. Therefore, valve 8AB2 was brought to K-1420 without having been purged.
2. Since valve 8AB2 was unpurged, approximately 500 grams of UF_6 was contained in the valve body. Approximately 75% or 375 grams of the UF_6 were spilled on the floor in K-1420. The building ventilation systems were shut down quickly. The maximum amount of the 375 gram spill that is estimated to have escaped the building is 50% or 187 grams of UF_6 or 127 grams of uranium. (See Attachment I.) This valve was located at a position in flow order below the normal feed point. There was no significant impact on the environment.

3. A total of 54 people were in K-1420 at the time of the release. (See Attachment II.) All of these submitted urine samples. Five people were found to have uranium content in the urine above the plant guideline. All were within the guideline when retested during the next two days.
4. A visual inspection by Operations personnel and a survey by Health Physics personnel found no significant amounts of uranium had accumulated on the K-1420 roof because of the release.
5. The method used to evacuate the building was to make an announcement over the building public address system. A follow-up check was made by K-1420 Supervision to see that all persons not involved in controlling the release were out of the building. Everyone was evacuated in a rapid and safe manner.
6. This is not the first time a release of this nature has occurred. On April 30, 1975, a 12-inch diameter block valve was opened in the K-1401 Valve Shop releasing a small quantity of UF₆. The investigation of the incident resulted in a verbal agreement between the K-1401 shop personnel and the Field Maintenance personnel that all process block valves would be delivered to the K-1401 shops or to K-1420 with the gates open.

Recommendations

The following recommendations are made as a result of the investigation of the release from valve 8AB2 of 902-4.8.

1. The method used to purge valve 8AB2 was abnormal due to unusual circumstances. This information was not passed on to K-1420 Operations or K-1401 shop personnel. In the future all block valves should be purged with the gates in the up or open position. If unusual circumstances ever arise in the future to prevent normal purge of a valve, the appropriate personnel both in K-1420 and K-1401 should be informed before the valve is shipped from the cascade. (Responsibility - Cascade Operations.)
2. Under normal circumstances, all block valves removed from the cascade should be in the open position when they are brought to either K-1420 or K-1401. It is recognized that space limitations prevent the removal of some valves in the completely open position. These valves should be opened as far as possible or be opened on the cell floor after removal and before shipment. K-1401 shop personnel will provide the Field Maintenance personnel with the necessary clamps to hold valves open once the valve operator has been removed.

In conjunction with this recommendation, a procedure will be developed to minimize the possibility of a UF_6 release when the valve is opened on the cell floor. (Responsibility⁶ - Cascade Operations.)

3. The building evacuation alarm in K-1420 can be tripped only by pulling a Gamewell fire alarm box. Some buildings in the ORGDP have push-buttons at several exits and other key locations that will trip the building evacuation alarm without calling the fire trucks and emergency squads. A system of this nature would have been useful during this release. The feasibility of installing such a system in K-1420 will be studied. (Responsibility - Chemical Operations.)

Investigating Committee

T. W. Avera	W. T. Northcutt
T. R. Cantrell	M. J. E. Shelton
W. A. Davis	J. E. Shoemaker
J. K. Keith	L. H. Sipe
N. G. McRae (Chairman)	C. L. Stair
M. E. Mitchell	D. J. Tevault

ATTACHMENT I

Environmental Impact of K-1420 UF₆ Release on June 9, 1976

At approximately 2:00 p.m. on June 9, 1976, the Environmental Management Group was advised that a UF₆ release had occurred at K-1420. Portable gas bubbler samplers were set up at two existing hi-volume air sample sites. The two sites chosen were the stations located north of K-25 and west of K-31, as these appeared to be most directly in the path of the prevailing winds.

While the data collected by the samplers actuated following the release indicated no detectable increase in atmospheric concentrations, the fact that these samplers were not actuated until one hour after the release occurred tends to preclude any meaningful interpretation of the data. Therefore, an evaluation of the effects of the uranium and HF released could only be made through the use of a mathematical model predicting the dispersion of the pollutants.

Considering that the total capacity of the valve bonnet is approximately 10 cubic feet and applying the appropriate correction factors for temperature and pressure, the maximum quantity of UF₆ which could have been trapped was determined to be approximately 500 grams. By applying stoichiometric equations assuming that 75% of the material was discharged from the valve and 50% of this material exited the building through the exhaust system, it was determined that a maximum of 127 grams of uranium was released from the building. Assuming that 100% of the HF produced from the hydrolysis of the released UF₆ escaped through the building exhaust system, the total quantity involved was determined to be 114 grams. Based on eye witness accounts of the release and an explanation of the unusual method which was used to purge the valve, the estimated quantities are thought to be the maximum amounts possible.

For purposes of diffusion modeling it was determined that: (1) the wind was blowing from the north-northeast at 20 miles per hour (8.94 m/sec); (2) the effective release height was approximately 113 feet (34.3 m); (3) The exit gas velocity was approximately 39.6 feet per second (12.1 m/sec), and it was further assumed that; (4) the 127 grams of uranium was released during a 3 minute period thus yielding a release rate of 0.71 grams/second; (5) the 114 grams of HF was released during a 10 minute period thus yielding a release rate of 0.19 grams/second; and (6) meteorological conditions were considered to be stable.

Calculations were performed for two locations; one near the center of the plant (approximately 2800 feet from the source) and another at the west perimeter fence (approximately 6800 feet from the source). Maximum theoretical ground level concentrations at these locations were found to be: U - $1.1 \times 10^{-3} \text{ ug/m}^3$, HF - $3.3 \times 10^{-14} \text{ ppb}$, and U - 1.1 ug/m^3 , HF - 0.33 ppb, respectively. The average background concentrations for the four monitoring stations nearest the plant perimeter during the period January to April 1976 were: U - $1.4 \times 10^{-2} \text{ ug/m}^3$, and HF - 0.67 ppb.

Comparison of values predicted by the dispersion modeling equations (for the station located at the west perimeter fence) with applicable standards and guidelines reveals: (1) the HF concentration is less than 0.0001% of the recommended 8-hour industrial exposure limit of 2.0 mg/m^3 (2427 ppb), and approximately 7% of the Tennessee 12-hour ambient air concentration limit of $3.7 \times 10^{-3} \text{ mg/m}^3$ (4.5 ppb) and (2) the maximum uranium concentration at this location (1.1 ug/m^3) is less than 0.00005% of the ERDA chemical toxicity limit, when averaged over a period of one week.

July 6, 1976

ATTACHMENT II

Personnel in K-1420 at Start of Release

K-1420 Operations

Compressor and Valve Shop

K-1420 Field Maintenance

25	Maintenance
29	Operations
<u>54</u>	Total



INTERNAL CORRESPONDENCE

NUCLEAR DIVISION

POST OFFICE BOX P, OAK RIDGE, TENNESSEE 37830

To (Name) A. J. Legeay
Division
Location

Copy to File - NoRC

Date January 15, 1975

Originating Dept.

Answering letter date

Subject K-1131 UF₆ Release
November 1, 1974Sequence of Events

As a part of the month-ending inventory, any partially filled UF₆ cylinders are valved off from the process, disconnected and weighed. Shortly after midnight on November 1, 1974, Paducah Product Feed cylinder number 1410 was to be removed from the M-1 autoclave in K-1131 for weighing. The cylinder valve was closed and the pigtail was purged in preparation for disconnecting. At approximately 0140 when the regular 'B' Shift Operator and an Operator Trainee attempted to loosen the pigtail connection, it began to smoke. They then opened the evacuation valve in an effort to stop the release, but to no avail. Thinking the cylinder valve must be leaking, the Operator then attempted to tighten the valve, but in his excitement he cracked the valve open causing the release to increase. Both men fled the cloud of UF₆ and HF, regained their composure, re-entered the area of the release, and closed the valve and tightened the pigtail, thus halting the release. The evacuation header was later found to be plugged. An estimated 100 grams of material was released.

Both Operators were wearing respirators, and they showered and changed clothes immediately after the release. They were sent to the ORGDP Medical Center as described in the next section. UF₆ release alarms were received in the K-29 Area Control Room and the ORGDP Central Control Room. By the time the K-29 Area Foreman arrived on the scene, however, the release had been secured.

Health Physics Aspects of Release

The two Operators who were involved in the release reported to the medical center about 7:30 a.m. and were given the routine medical examination by a plant physician for persons involved in a UF₆ release. As a part of the examination, the employees were checked by Health Physics for possible body contamination. No detectable contamination was noted. The employees had showered immediately following the release and submitted a urine specimen at 6:00 a.m. for laboratory analyses. The employees were told by the physician to return for a follow-up check upon reporting for work on their next shift starting November 5.

This document has been approved for release
to the public by:

Technical Information Officer
Oak Ridge K-25 Site

11/3/95
Date

Prepared by Union Carbide Corporation-Nuclear
Division, operating contractor for the U.S. Department
of Energy under U.S. Government Contract No.
W-7405-eng-26.

The two initial urine specimen analyses showed an excretion rate of 1.116 and 0.338 mg/l for uranium mass and 242.8 and 87.8 d/m/100 ml for alpha activity, respectively. All of the sample results were above the plant recall value of 0.067 mg/l for uranium mass and 10 d/m/100 ml for alpha activity. However, a subsequent specimen on their follow-up check showed the urinary uranium excretion rate to be well below the plant guide values, indicating no significant body retention.

A detailed analysis of the highest excretion value noted, 1.116 mg/l obtained 5 hours after the exposure indicated that the amount of soluble uranium absorbed was equivalent to an exposure for 1 week to 70% of the AEC Radiation Control Value applicable to continuous working exposure or 5.37% of this value for one quarter.

Airborne sample results taken from a continuous air monitor located in the area approximately 100 ft from the point of release showed an average count rate of 4.5 c/m/ft³ of air during the 8-hr period in which the release occurred. Results of the succeeding 8-hr sample showed the count rate had returned to normal and was well below the plant action guide of 2 c/m/ft³ of air.

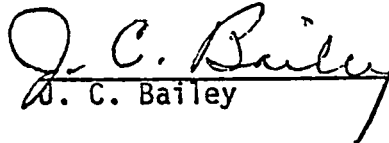
Following decontamination of the immediate involved area a follow-up contamination survey was made of the entire area which showed no significant change from the most recent survey preceding the release. The survey index of 7.2 was below the specified guide value of 10 for considering an area uncontaminated.

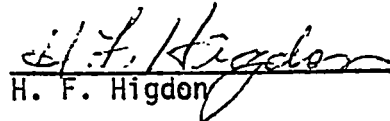
Conclusions and Recommendations

- 1) When a pigtail connection is loosened and found to be smoking, the proper procedure is to immediately re-tighten the connection and give the pigtail additional purges. All K-1131 operators have been instructed on this procedure and the procedure is available in written form at the operator's desk. A UF₆ release is an infrequent occurrence and upon seeing the release, the operators were confused. Had the pigtail connection been re-tightened upon the first sight of smoke, no release would have occurred. In the confusion however, the wrong course of action was pursued. Once the operators moved out of the smoke and regained their composure, they took the proper steps to stop the release.
- 2) Several steps have recently been taken or will be taken in an effort to strengthen K-1131 operations:
 - a) In April 1974 an additional operator per shift was added to K-1131 and K-413 operations to provide added strength in these areas. This addition was intended to provide a double-check on operations in these facilities.
 - b) During the past year the K-29 shift foremen have been relieved on days and they have spent their time training the operators. Each K-29 foreman has spent approximately two weeks with his K-1131 operators during this period. This program will continue.

January 15, 1975

- c) A series of local drills is planned for K-1131 and K-413 early in 1975. These drills will concern UF₆ releases and will acquaint the operators involved with the proper actions to take using simulated releases.
- 3) Proper procedures for safely conducting operations where UF₆ releases can occur will be stressed during safety meetings.
- 4) Although both Operators were wearing respirators, they still were exposed to some airborne uranium. Evidently the respirators were not fitted properly. This situation should be remedied by the recent program by Industrial Hygiene to properly fit employees with respirators. All K-1131 Operators have now been successfully fitted.


J. C. Bailey


H. F. Higdon


J. E. Shoemaker

JCB:HFH:JES:fmf

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K-1131 UF₆ Release on December 19, 1974

At approximately 12:45 pm on December 19, 1974, a small UF₆ release occurred from an instrument line from the Normal Feed System in K-1131. An estimated 100 grams of material escaped before Operations and Maintenance personnel could find and halt the release. The instrument line was to a transmitter which controls the Normal Feed Control Valve. This line is located in a trench underneath the floor near the Operator's desk in K-1131.

Trouble was being experienced in controlling the feed rate prior to the release and Maintenance was called to investigate and repair. It was noted that several steam condensate traps which serve the steam tracing for feed system instrument lines were cold. However, steam to the autoclaves was not interrupted. While investigating this situation, the steam to the traps came on again. Approximately 5 minutes after this happened, a wisp of smoke was observed coming out of the trench. Moments later the wisp increased and the line "burped" a couple of times. The Operators and Maintenance workers exited the area, sounded the evacuation alarm, donned army assault masks, reentered the area and halted the release.

Subsequent examination of the rupture indicated that the copper instrument line had burst from internal pressure. Evidently, a UF₆ plug in this line had occurred causing the feed control problems. The plug had occurred because the steam was blocked to the traps. When the steam was reapplied, the plug expanded and the tubing ruptured.

All those personnel who were in the area of the release when it occurred were sent to the dispensary. The steam blockage was evidently caused by a plugged steam line to the traps which cooled off since steam to the autoclaves was not interrupted. The closest steam valve which could have been closed to cause the problem would have also blocked steam to the autoclaves.

JES:fmf

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Division, operating contractor for the U.S. Department
of Energy under U.S. Government Contract No.
W-7405-eng-26.

12/19/74
K-1131
100 grams
released.
of UF₆ 69.694.

This document has been approved for release
to the public by:
Gary W. Hall, ASQ 11/3/95
Technical Information Officer
Oak Ridge K-25 Site



INTERNAL CORRESPONDENCE

NUCLEAR DIVISION

POST OFFICE BOX P, OAK RIDGE, TENNESSEE 37830

To (Name) A. J. Legeay

Date May 9, 1975

Division

Originating Dept.

Location

Answering letter date

Copy to

Subject UF₆ Release
K-902-5.2.8L. W. Anderson
B. I. V. Bailey
W. A. Davis
H. F. Higdon
C. C. Hull
E. H. Krieg, Jr.
K. W. Sommerfeld
L. A. Studinger
1) R. A. Winkel ✓
File - RC

K-P-6156

5/6/75
K-902-5.2.8
← 10 gm of UF₆
6.8 g u.

5-15-75

A committee was formed to investigate the UF₆ release which occurred when a compressor was removed from the process system in K-902-5 cell 2, stage 8. The findings of the committee are as follows:

K-902-5.2.8 compressor debladed at approximately 0940 while the cell was operating on-stream Wednesday, May 5, 1975. The cell was isolated, evacuated to low pressure, and purged. Following this, a low pressure sample was taken and checked for UF₆ content as specified in SOP 935.5, *Purging a Cell*. The sample results indicated that the system was at a UF₆ negative. The UF₆ system was then pressured to atmosphere with air. A Safety Work Permit and an Electrical Work Permit were issued by the Operation's Foreman-in-Charge to Mechanical Maintenance for the compressor change in accordance with SPP-B-321, *Safety Work Permit*; and SPP-B-323, *Electrical Work Permit - Power Operations*, respectively.

The stage 8 compressor was cut loose from the PG piping by 1515. The welders wore respirators while cutting the compressor out and reported that the system did not smoke when it was cut into. The compressor was originally scheduled to be lifted out on the 4-12 shift; but due to changes in priorities, no work was performed other than a radiation survey. In accordance with SOP 105.3, *Conservation of Uranium Bearing Material*, the stage 8 compressor was surveyed with a Ludlum instrument for unsuspected deposits and tagged with a contamination tag, UCN-15. The survey revealed no deposits in the system.

At about 0130, May 7, the compressor was lifted from its base. As the compressor was raised, smoke was observed coming out of the B-inlet line to the stage 8 compressor. Due to the 10 hour period that the system

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Sally W. Hall on AS2
Technical Information Officer
Oak Ridge K-25 Site

11/3/95
Date

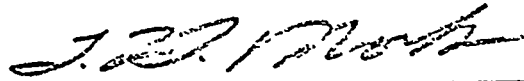
had been open to atmospheric pressure, personnel performing the work did not expect a release from the system and did not have respiratory protection readily available. A maintenance mechanic contacted the power operator in the Central Control Room concerning the release; however, thru a breakdown in communications the Central Control Room relayed the message via radio to look for a hot transformer rather than a UF_6 release. Operations personnel immediately started to look for a hot transformer and did not obtain respirators. The compressor was lowered back into position and the system opening covered with a plastic cover and tape. Five maintenance personnel and two operators were exposed to the release during the operation. All were sent to Medical for a supervisory check. Urinalysis results indicated four of the seven employees were above the uranium recall level and that two of these four were above the alpha recall level. All seven employees resubmitted a urinalysis sample the day after the release. The results of the second samples indicated all seven employees were well below the uranium and alpha recall levels.

Following the release the work area around the compressor was surveyed by Health Physics. The survey gave no evidence of general spread of contamination, and contamination levels were low. The plastic covers were removed from the B-line without further release. The inside of the pipe had a thin white film of material present which was removed from as much of the pipe as possible by Chemical Operations personnel. The B-inlet valve seats on the cell were checked for leak tightness and found to be tight. The committee concluded that the release probably occurred due to a small pocket of material remaining in the B-line between the stage 8 compressor and the cell B-inlet block valve, or from outgasing. This particular line is 30-inches in diameter, about 70 feet long, and deadened when the cell is isolated.

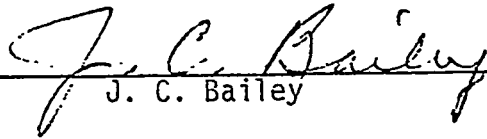
Recommendations to Prevent a Recurrence:

- 1) Respiratory protections shall be worn at all times when cutting out the process system. (Which was done in this case)
- 2) On any work around UF_6 systems, respirators shall be readily available.
- 3) Crane operators should always carry their own respirators. There was no mask in the crane cab which was being used due to the crane having recently been upgraded.
- 4) Operation's personnel shall carry respirators with them for investigating reports of any unspecified smoke or fumes.

- 5) Equipment should be promptly removed following purging of the system to minimize releases from outgasing.



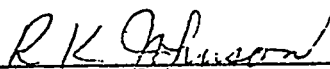
T. H. Monk, Chairman



J. C. Bailey



T. B. Bomar



R. K. Johnson

MATERIAL RELEASE REPORT

SEE SPP 354, "Reporting of Accidents, Injuries, or Other Unusual Operating Incidents"

Time of Release 0130 Foreman in Charge W. C. Chapman- Operations
 Date of Release May 6, 1975 At Time of Release R. W. Keylon - Maintenance
 Type of Material (F₂, UF₆, Etc.) UF₆ Duration or Release Less than 15 minutes

Location K-33-5.2.8 Cell Floor
 (BUILDING) (FLOOR) (EQUIPMENT INVOLVED)

Approximate Amount of Release Less than 10 gm Time Emergency Cleared 0200, May 6, 1975

Description of Release (Cause, Area Affected, Etc.)
See K-P-6156, "UF₆ Release, K-902-5.2.8", May 9, 1975

PERSONNEL REFERRED TO THE DISPENSARY

NAME	BADGE NO.	LOCATION AT TIME OF RELEASE
		<u>Cell Floor</u>
		<u>Cell Floor</u>
		<u>Cell Floor</u>
		<u>Cell Floor</u>
		<u>Cell Floor</u>
		<u>Cell Floor</u>
		<u>Cell Floor</u>

MONITORING FOR RADIOACTIVE CONTAMINATION

AIR-BORNE ALPHA ACTIVITY

LOCATION	TIME	ACTIVITY (C/MIN/FT ³)

SURFACE ALPHA CONTAMINATION

RANGE IN C/MIN	SURFACE	WIPE
Class I	500 - 2000	100 - 500
Class II	2000 - 10,000	500 - 2000
Class III	> 10,000	> 2000

BEFORE DECONTAMINATION *				AFTER DECONTAMINATION			
AREA (FT ²)		MAX. READING		AREA (FT ²)		MAX. READING	
SURFACE	WIPE	SURFACE	WIPE	SURFACE	WIPE	SURFACE	WIPE

MAXIMUM READING	READING AT 1'	7.5 MREP/HR DISTANCE	MAXIMUM READING	READING AT 1'	7.5 MREP/HR DISTANCE

BETA-GAMMA RADIATION

RANGE	MREP / HR
Class I	7.5 - 37.5
Class II	37.5 - 300
Class III	300 - 3000
Class IV	> 3000

*Health Physics survey results indicated floor readings were all less than
 Clean-up Method Used 500 c/min No decontamination of floors was necessary
 What Specific Actions Have Been Taken to Prevent a Similar Incident?

SUPERVISOR J. D. Moe DEPARTMENT 1730 DATE 5/14/75
 APPROVED: DIVISION SUPERINTENDENT OR REPRESENTATIVE A. J. Legay DATE 5/14/75

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WO# Write-off
number

NOL = Normal Operating
Loss

units probably
grams

Found in Alice Laya's
File Material

Miscellaneous Information
on Emissions

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Sally W. Hall for ASQ
Technical Information Officer
Oak Ridge K-25 Site

11/3/75
Date

Prepared by Union Carbide Corporation-Nuclear
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of Energy under U.S. Government Contract No.
W-7405-eng-26.

Physical year 1984 BWD

date	mat'l descrip	wt #	LI	U235	WT. g.	Comments or description
10/83	Contamin Water	306	68	0	.89	Pil K-1200
	Cont Serap	307	4	4	7110	Burial Qui Research
	UFe	308	53	2	3.2	NOZ for Sept 83 K 402-9
12/83	UFe	309	47	2	3.5	NOZ Oct 83 K-402-9
	UFe	310	50	2	3.5	NOZ Oct 83 K-402-9
	Cont. Serap	311	4	4	7110	Burial K-1200
1/84	Cont Serap	312	4	4	.6990	Burial K-1200
	Cont Water	313	61	1	.92	Pil K 1407A
	Cont Water	314	82	1	.84	Pil K 1407A
	UFe	315	44	2	3.5	NOZ (Nov) K 402-9
	UFe	316	28	1	3.5	NOZ (Nov) K 402-9
	UFe	317	49	2	3.5	NOZ (Dec) K 402-9
	UFe	318	29	1	3.5	NOZ (Dec) K 402-9
2/84	Cont Serap	319	4	4	7110	Burial Qui Research
3/84	Cont Waste	320	4	4	7110	Burial K-1200
	UFe	321	48	2	3.5	NOZ Jan K 402-9
	UFe	322	20	1	3.5	NOZ Jan K 402-9
4/84	Cont Water	323	25	0	.9503	Pil (K-1200) K 1407A
	Cont Water	324	4	4	7110	Burial (K-1200)
5/84	UFe	325	33	1	3.5	NOZ Feb K 402-9
	UFe	326	52	2	3.5	NOZ Feb K 402-9

Physicid year 1984 BWD

date	find description	WW #	u	u235	wt 90	Cause n disposition	
5/84	cond UFG	327	23	1	3.5	NOZ (March)	vented
	UFG	328	29	1	3.5	NOZ (March)	Pnd
		329					
7/84	Cond Water	330	48	+	.92	Pul	K 1707A
8/84	Derap	331	+	x	7110	Burial	
9/84	Cond Water	334	53	x	8902	Pul	K 1407A
	AETF Machine	335	19000	x	7110	Burial	

Dampers 7 or 8 Kgs
each

from Centrifuge

depleted Uranium

so 14,000 would

be 2 dampers

dampers are depleted
uranium metal not 4%

Biological year 1985 BWA

Date	mat'l descrip	WD #	U	U235	wt %	Case -> dispos. for
10/84	UF6 (opul may, June, July)	332	1477	52	3.5	N.O.L. Pond K1407C
	UF6 (opul, may, June, July)	333	90	3	3.5	N.O.L. Atmosphere
	UF6	336	97	3	3.2	Pond K1407C
	UF6	337	8	+	3.5	Atmosphere (concentration in opul)
	UF6	338	102000	+	2	Burial
	Cond. water	339	121	1	8300	Pond K1407C
	UF6	340	131	*	3.5	N.O.L.
	UF6	341	31	1	3.5	Pond K1407C
	(UF6	342	14000	*	2	Burial dampers
	UF6	342	14000	*	x	used and shipped
11/84	Cond decay	343	*	*	x	Burial
	UF6	344	7000	+	2	Burial dampers
	UF6 (Sept)	345	121	4	3.5	Pond K1407C
	UF6 (Sept)	346	26	1	3.5	Atmosphere
	UF6	347	*	+	71/6	Atmosphere
	Cond waste	348	*	+	71/6	Burial
	UF6	349	111	4	3.5	Atmosphere
	UF6	350	74	3	3.5	Pond K1407C
12/84						

Repaired year 1985 13WD cont

Cause & disposition

WT %

U235

U

WD #

Date material description

Burned dampen
Atmosphere
Grid K14070
Grid

.2
3.50
3.5
.95

*
1
13
*

33000
32
350
42

351
352
353
354

21F6
21F6
21F6
Cool Water

1/85

Lab Solutions
currently accumulated
and written to Waste
Management on
RFD

Davis Gray =
titration technique

Repetical gas 1984

925.

Material description	21.0 #	U	4235	Wt %	
10/83 Davis Bray Sol. Sol.	922	6	*	3.5	K1407B
Low. Sol.	923	5930	59	1.00	K1407B
11/83 Low. Solution	924	5870	59	1.00	K1407B
Davis Bray Solution.	925	61	1	1.5	K1407B
12/83 Davis Bray Solution	926	35	0	1.5	K1407B
Low. Solution	927	5870	59	1.0	K1407B
1/84 Davis Bray Sol. Waste	928	14	*	1.5	K1407B
Low. Solution	929	10 560	106	1.0	K1407B
2/84 Davis Bray Sol. Waste	930	24	*	1.5	K1407B
Davis Bray Sol. Waste	931	24	*	1.5	K1407B
Contaminated Solution	932	5263	53	1.0	K1407B
3/84 Davis Bray Sol. Waste	933	10	*	1.5	K1407B
Davis Bray Sol. Waste	934	4	*	1.5	K1407B
Low. Solution	938	7603	76	1.0	K1407B
Waste off	935	VOID			
	936	↓			
	937	VOID			
	939				
	940	*	* 70	42.97	VOID
	941	*	*	17.97	VOID

Physical year 1984 725 grams

Material description	210	2235	U	%	U.S.	Notes
4/84 Darius Gray Sol Waste	942	*	17	1.50		Ford K-1407B
Darius Gray Sol Waste	943	*	12	1.5		↓
Contaminated Solution	944	98	9811	1.0		↓
Depleted U-235	945	*	*	.2		Dark Farm
	946	*	*	.2		Dark Farm
	947	*	*	.2		↓
	948	*	*	.2		↓
	949	*	*	7.118		Used Ex permentale
Unit of Normal U-235	950	*	*	.20		Dark Farm
Depleted U-235	951	101	10138	1.0		Ford K-1407B
Contaminated Sol.	952	*	23	3.13		Dark Farm
Dep. + En. U-235	953	*	*	.28		Dark Farm
Dep. U-235	954	*	*	.2		Dark Farm
Depleted U-235	955	101	10138	1.		Ford K-1407B
Enriched Sol.	956	18	432	4.		West End Farm
Depleted U-235	957	101	10138	1.		Ford K-1407B
Cont. Solution	958	6	17	7.2		West End Farm
Enriched U-235	959	*	*	.2		West End Farm
Depleted U-235	960	*	*	.2		West End Farm
Depleted U-235	961	*	3000			Not in file
Darius Gray Sol Waste	962	2	180	1.5		Ford K-1407B
Enriched Sol.	963	3	4987	2.2060		Ford K-1407B
Enriched Solution	964	101	10138	1.		Ford K-1407B

Therapeutic year 1.54 in grams 72E

material description	AD #	n	mass	wt %	
8/84 Denis Gray	965	99	1	1.5	Bond K-1407B
9/84	966	10138	101	1.0	Bond K-1407B
cont	967	331	38	23.46	West Jand Jand
	968	227	15	6.66	h
	969	1000	*	22	West Jand Jand
	970	198	46		Not on 4.1e

Chemical year 1985 726 cont

WD #	U	U235	WT %	
0184	9711	10138	1.00	Pond K-1407B
	972	*	.7110	Pond K-1407B
1184	9713	.97	83.45	West End Farm 1-10
	974	85	64.33	
	975	*	.2	
	976	166	62.29	
	976	1000	.2100	
	977	2000	.2200	
	978	321	85.96	
	979	178	73.15	
	980	162	72.95	
	981	66	1.5	Pond K-1407B
	982	515	1.4700	1/2 West End Farm
12184	983	10138	1.0000	Pond
	984	2000		1/2 Tank Farm
	985	*	.2	1-12 West End Farm
	986	10138	1.	Pond K-1407B
	987	47	1.5	Pond K-1407B
	988	*	.2	1-12 W. End Farm
	989	443	.73	1/2 W. End Farm
1185	990	*	.2	West Farm
	991	1568	4.88	West Farm
	992	*		Pond
	993	10138		Pond K-1407B
	994	1000		1/2 Farm
	995	516		West Farm

Physical year 1985 can't 725

Material Description	WD #
Enriched Seed	996
Davis Gray Solution	997
Enriched Seed	998
Enriched Seed	999
Enriched Seed	1000
Davis Gray Solution	1001
Enriched Seed	1002
Davis Gray	1003

U	4235
66	31
15	*
55	22
54	16
66	28
23	*
129	106
16	*

Seed Farm
Food
Seed Farm
Seed Farm
Seed Farm
Food
Seed Farm
Food

Drupical op. 1984 for emissions & blowdowns

Bldg		K-27-9	
1/83	Vented to atmosphere Blowdown		
1/83	Vented to atmosphere Blowdown		
2/83	Vented to atmosphere Blowdown		
1/84	Vented to atmosphere Blowdown		
2/84	Vented to atmosphere Blowdown		
3/84	Vented to atmosphere Blowdown		
4/84	Vented to atmosphere Blowdown		
5/84	Vented to atmosphere Blowdown		
6/84	Vented to atmosphere Blowdown		
7/84	Vented to atmosphere Blowdown		
8/84	Vented to atmosphere Blowdown		
9/84	Vented to atmosphere Blowdown		

21	21.235	24.70	
47	2		3.5
50	2		
44	2		
28	1		
49	2		
29	1		
50	2		
26	1		
38	1		
52	2		
23	1		
29	1		
13	1		
474	17		
49	2		
439	15		
16	1		
277	10		
13	*		
287	10		
13	*		
31	1		
26	1		
121	H		

This document was found in file
pertaining to preparation of
K-HS-95 (2/28/86) which would
imply ~~it was~~ or these quantities
are included in the report.

JR 2/2/94

2845

ORGDG UF₆ MATERIAL RELEASES
1/1/84 to 7/15/85

<u>Date</u>	<u>Event/Circumstances</u>	<u>Quantities (Grams)</u>
01-18-84	K-1004-A. Leaking sampling apparatus.	< 1
01-23-84	K-402-1. Testing line.	< 1
✓ 02-09-84	K-402-9. Valve leak.	< 1
02-24-84	K-413. Peanut valve.	< 1
03-15-84	K-631, K-4021. Valve change.	< 1
04-01-84	K-633. Motor shaft.	< 1
04-03-84	K-1131. Removed seal.	< 1
04-15-84	K-1131. Seal failure.	< 1
05-03-84	K-4029. Changing seal.	< 1
05-22-84	K-4029. Changing seal.	< 1
✓ 06-05-84	K-413. Sample tube developed crack.	< 1
07-23-84	K-1131. Replacing valves.	< 1
✓ 07-24-84	K-1131. Valve removal.	< 1
07-20-84	K-1210. Removing pigtails.	< 1
08-01-84	K-33. Valve removal.	< 1
08-15-84	K-1131. Burnt hole in line.	< 1
✓ 09-21-84	K-413. Cutting vent line.	< 1
✓ 09-27-84	K-413. Pigtail feed line.	5
09-28-84	K-29. Outgas from 2A seal.	< 1
10-02-84	K-1423. Drain line smoking.	< 1
✓ 10-18-84	K-402-8.	< 1

This document has been approved for release
to the public by:

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Technical Information Officer
Oak Ridge K-25 Site

11/3/95
Date

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✓ 11-15-84	K-29. Seal failure.	< 1
✓ 12-08-84	K-1004-L. Leaking pigtail.	5
11-30-84	K-33. Cut into line.	< 1
<u>1985</u>		
01-10-85	K-402-9. Release from seal cavity.	< 1
01-17-85	K-31. Changing compressor.	< 1
✓ 02-04-85	K-413. Leaking valve.	< 1
02-23-85	K-1131. Smoking drain valve.	< 1
04-01-85	K-1210. Cut into feed line.	< 1
04-01-85	K-29. Smoking valve.	< 1
✓ 04-15-85	Railyard. Leaking valve.	20
✓ 04-16-85	K-1423. Drain line blew out when changing cylinders.	70
✓ 04-25-85	K-413. Cut in south drain manifold.	< 1
✓ 04-26-85	K-413. Valve leaking.	5
04-29-85	K-413. Cutting into valve buffer line.	< 1
05-08-85	K-413. Outgassing of residual deposit in drain line.	< 1
05-09-85	K-413. Outgassing of residual deposits in drain line.	< 1
05-13-85	K-413. Outgassing of residual deposits in drain line.	< 1
05-13-85	K-413. Outgassing of residual deposits in drain line.	< 1
05-16-85	K-413. Outgassing from deposit in south sample box tubing.	< 1
05-19-85	K-502-3. Cell 1 stage 8 was shut down for 8A seal change, cell was slightly above atmospheric pressure.	< 1

05-23-85	K-27-9. Cell 6 stage 5B small deposit in seal cavity.	<1
07-15-85	K-1423. Cylinder inadvertently rotated before being disconnected resulting in a ruptured drain line.	25